

REMARKS

Applicants acknowledge receipt of an Office Action dated September 30, 2003. Claims 21-41 remain pending in this application. Applicants respectfully request reconsideration of the present application in view of the remarks which follow.

Rejections under 35 U.S.C. § 103

On page 2 of the Office Action, the PTO has rejected claims 21-29, 31-33 and 35-37 under 35 U.S.C. §103(a) as being obvious over U.S. Patent 5,458,703 to Nakai (hereafter "Nakai"), JP 08193240 (hereafter "JP '240") or U.S. Patent 5,972,129 to Beguinot *et al.* (hereafter "Beguinot"). In addition, the PTO has rejected claims 23, 27 and 37 under 35 U.S.C. 103(a) as being obvious over JP 8246096 (hereafter "JP '096"). Finally, on page 4 of the Office Action, the PTO has rejected claims 30, 34 and 38-41 under U.S.C. 103(a) as being obvious over any of the previously cited references in further view of JP 09041076 (hereafter "JP '076") or by JP '076 alone. Applicants respectfully traverse these rejections for the reasons set forth below.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974). See MPEP §2143.03. Here, none of the cited references, namely, Nakai, JP '240, Beguinot, JP '096 or JP '076, taken either individually or in combination, teach or properly suggest heat-resisting steel compositions as set forth in each of independent claims 21-26 "wherein the heat resisting steel consists of a bainite single phase".

Comparative Data in Specification

Even if the PTO were to have established a proper *prima facie* case of obviousness (and Applicants do not concede that the PTO has done so here), such a case can be rebutted by evidence of secondary considerations such as unexpected results. Such evidence includes comparative data in the specification which is intended to illustrate the claimed invention. See MPEP §2141 and MPEP §716.01(a). This is also true in instances where claimed ranges overlap or lie within ranges disclosed in the prior art. See MPEP §2141.05. Here, Applicants have provided comparative data in Tables 1-3 on pages 12-14 of the specification.

With particular regard to Beguinot, Applicants note that comparative examples C1-C9 in the present specification, fall within the composition ranges of Beguinot but outside the presently claimed ranges. With regard to Nakai, Applicants note that comparative examples

C1, C3 and C5-C9 fall within the composition of Nakai but outside the presently claimed compositions. With regard to JP '240, Applicants note that comparative example C3 falls within the composition of JP '240 but outside the presently claimed compositions. Finally, with regard to JP '096, Applicants note that comparative example C5 falls within the compositions of JP '096 but outside the presently claimed compositions.

As seen in Table 2 of the present specification, the steels of the claimed embodiments of the present invention exhibit (1) significantly higher times taken before creep rupture and/or (2) significantly higher impact absorbing energy than the steels of comparative examples C1-C9. Thus, the comparative data in the present specification demonstrates that the presently claimed steels exhibit unexpected results as compared to the steels of Beguinot, Nakai, JP '240 and JP '096.

In the paragraph bridging pages 4 and 5 of the Office Action, the PTO has stated that three properties of C5-C7 are within the ranges of P1 to P24 – tensile strength, creep rupture time, and impact-absorbing energy. However, the PTO has apparently misread the results shown in Tables 1 and 2.

Applicants note that the present specification, in the description of the examples/comparative examples, states that “[a]ll of these steels have been controlled to have a tensile strength of approximately 750MPa.” (See page 8, lines 24–26, page 9, lines 18–20, and page 10, lines 13–15 of the specification). From the context of the statement, it is readily apparent that the phrase “all of these steels” refers to C1–C7 as well as P1–P24. Since all the steels, including both C5–C7 and P1–P24, were controlled to have the same tensile strength (for the purpose of providing a level comparison), Applicants submit that it is not meaningful to compare the tensile strength of C5–C7 with that of P1–P24. Accordingly, comparison in properties between P1–P24 and C1–C7 should be done based only on the creep rupture time and impact-absorbing energy, on the premise that C1-C7 and P1-P24 have substantially the same level of tensile strength.

In addition, Applicants note that P1–P24 are superior to C1–C7 in creep rupture time and/or impact-absorbing energy. Applicants note that none of the comparative examples exhibits (1) a creep rupture time of more than 1000 h, (2) a creep rupture time of 800-1000 h and impact-absorbing energy of more than 100 J, or (3) an impact-absorbing energy of more than 250 J.

In accordance with the above criteria, it is clear that each of P1–P24 exhibits at least one of the properties of (1) to (3), while none of C1–C9 exhibits the properties of (1) to (3). From the data in Table 2 of the specification, it is clear that the steel of the present invention does not always have to be superior in both creep rupture time and impact-absorbing energy, provided that either one of these parameters, individually, is excellent. In fact, page 10, lines 20–25 of the specification states that “[t]he heat-resisting steels of the present invention are superior to the comparative ones in both time taken before undergoing rupture and impact-absorbing energy, or at least in impact-absorbing energy even if they are inferior to the comparative ones in time taken before undergoing rupture.” (Emphasis added).

Accordingly, Applicants submit that the creep rupture time and impact-absorbing energy of P1 to P24 are clearly different from those of C5–C7, and, therefore, the claimed ranges are significant inasmuch as they produce the benefits exemplified in Table 2 of the specification. Applicants respectfully request that the PTO reconsider the comparative data set forth in the specification in light of these remarks.

Rule 132 Declaration

In the first full paragraph on page 5 of the Office Action, the PTO stated that comparisons must be done under identical conditions except for the novel features of the invention. Although in Applicants view, the data already of record in this case is fully sufficient to objectively demonstrate that the claimed invention evidences unexpectedly superior properties, Applicants have nevertheless prepared supplemental data, in response to the PTO’s suggestion.

Applicants submit herewith a Rule 132 Declaration executed by Mr. Ryuichi Ishii. The data in the declaration shows the criticality at the upper limit of the carbon (C) content, *i.e.*, 0.3% by weight as well as of the lower limit of the tungsten (W) content, *i.e.*, 1.5% by weight.

Specifically, Experiment 1 in the Declaration demonstrates that, when the carbon content is less than 0.3% by weight, creep rupture time is significantly prolonged and absorbed energy significantly increases. As shown in Table 1 of the Declaration, steel P1A has a composition similar to that of steel P1 of the present invention, except for whether or not the carbon content is less than 0.30% by weight, which is the upper limit defined in the independent claims 21 to 26. This means that this comparison has done under substantially identical conditions except for the novel features of the invention as the PTO has requested.

Accordingly, Applicants submit that the results shown in Experiment 1 support the criticality of the upper limit of the carbon (C) content, *i.e.*, 0.30% by weight.

Experiment 2 in the Declaration demonstrates that, when the tungsten content is more than 1.5% by weight, creep rupture time is significantly prolonged. Applicants note that, as shown in Table 3 of the Declaration, steel P5A has a composition similar to that of steel P5 of the present invention, except for whether or not the tungsten content is more than 1.5% by weight, which is the lower limit defined in independent claims 21 to 26. This means that the comparison is done under substantially identical conditions except for the novel features of the invention as the PTO has requested. Accordingly, Applicants believe that the results shown in Experiment 2 support the criticality of the lower limit of the tungsten (W) content, *i.e.*, 1.5% by weight.

Applicants submit that the foregoing data establishes the criticality of both the upper limit of the carbon (C) content and also for the lower limit of the tungsten (W) content set forth in claims 21-26.

Cited References

In the first full paragraph on page 3 of the Office Action, the PTO states that all the cited references are silent about the bainitic structure except Beguinot. The PTO suggests that Beguinot discloses alloys substantially the same as those of the present invention. Beguinot, however, fails to disclose or suggest the specific contents of carbon and tungsten defined in independent claims 21 to 26. Beguinot merely discloses quite a broad range of the carbon content of 0.04% to 0.80%. This includes the claimed range of 0.30% to 0.80%, which results in a shorter creep rupture time and less absorbed energy as demonstrated in the Declaration. Beguinot also discloses quite a broad range of the tungsten content of 0% to 3%. This includes the range of 0% to 1.5%, which results in a shorter creep rupture time as demonstrated in the Declaration. Beguinot fails to teach or suggest that one might obtain unexpectedly improved creep rupture time and absorbed energy based upon the presently claimed ranges of carbon (C) and tungsten (W). Moreover, the fact that the present claims recite two separate narrowly defined component ranges that are only broadly disclosed in Beguinot introduces even less likelihood that Beguinot might accidentally produce a composition falling within the present claims. There is certainly no teaching or suggestion in Beguinot to select amounts of carbon and tungsten within the presently claimed amounts.

Applicants also note that Beguinot discloses quite a general composition for smelting a titanium steel, and the composition range of the steel of this reference is too broad to fully disclose a heat-resisting steel with specific benefits. In fact, all the elements except for nitrogen (N) and titanium (Ti) are optional, in that lower limits of these elements are zero (see columns 9 and 10). In addition, although Beguinot discloses aluminum as an optional element, this reference completely fails to teach or suggest the benefits attained by excluding aluminum, as already demonstrated in Applicants previously filed Rule 132 Declaration and the accompanying response.

As discussed above, none of the cited references, taken either individually or in combination, teaches or properly suggests heat-resisting steel compositions having the totality of characteristics set forth in each of independent claims 21-26 "wherein the heat resisting steel consists of a bainite single phase", and, in view of the data set forth in the specification and Applicants' Rule 132 Declarations, Applicants submit that they have established unexpected results sufficient to rebut any case of *prima facie* obvious that the PTO, *arguendo*, might have established. For these reasons, Applicants submit that the rejections under §103 should be withdrawn.

If an independent claim is nonobvious under §103, then any claim depending therefrom is nonobvious. *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988). See MPEP 2143.03. Thus, Applicants submit that claims 27-41, which ultimately depend from one of independent claims 21-26, are also non-obvious.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections under §103.

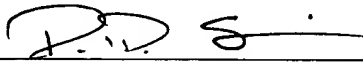
CONCLUSION

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

Date 3/30/04

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The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.